Space Weather Forecast

Issued on Friday, 21 July 2023 at 13:09 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of Minor/Moderate blackouts throughout. Chance of Minor/Moderate geomagnetic storms today.

Analysis of Space Weather Activity over past 24 hours
Solar Activity: Solar activity has been Low, with the largest flare a Common-class, peaking at 20/1949UTC from a region in the northwest. There are currently six sunspot regions on the solar disc. There has been little or no significant change in any of the regions during the period. The region responsible for the largest flare remains the largest and most complex region, with some magnetic complexity. Three further regions persist as groups with a reasonable size, but have been stable.
No Earth-directed Coronal Mass Ejections (CMEs) were observed in the available imagery.

Solar Wind / Geomagnetic Activity: Solar wind parameters showed a weak CME arrival at 20/1610Z. Solar wind speed jumped from 375 to 450km/s as the CME arrived, and is currently around 370 km/s. The Interplanetary Magnetic Field reached moderate levels with the CME arrival, but has since declined back to weak levels. The north-south component varied moderately after the CME arrived and is now varying weakly. Geomagnetic activity has been Quiet to Unsettled (Kp 0-3), with an Active (Kp 4) interval 20/1500-1800 UTC.

Energetic Particles / Solar Radiation: Solar radiation levels were still declining after the recent radiation storm, but are now just slightly elevated above normal background levels and well below the S1/Minor Storm level.

Four-Day Space Weather Forecast Summary
Solar Activity: Solar activity is likely to be Low, but with a chance of becoming Moderate. These are most likely from the largest and most complex region, but several other regions on the disc also contribute to this risk.

Solar Wind / Geomagnetic Activity: A CME which left the Sun on 18 July may give a glancing blow today (21 July). Satellite imagery was very scant during the eruption, giving low confidence in this analysis. Weak fast wind influence is possible from two coronal holes during this period, with wind speeds of 450-500 km/s possible early in the period and again later in the period. Fast wind effects may be masked by any CME arrival, however.
Geomagnetic activity is expected to be Quiet to Unsettled for much of this period, with occasional Active intervals under weak fast wind influence, and a chance of G1-G2/Minor to Moderate geomagnetic storm intervals today, should the CME arrive.

Energetic Particles / Solar Radiation: The high energy (greater than 10MeV) proton flux is expected to continue to decline, reaching background levels, but with a slight chance of further increases should any larger flares occur. Later in the period there is a slight increase in the probability of S1 as the largest region rotates further across the western hemisphere.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	30	10	1	5
Strong	G3	No	5	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	45	45	45	45
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	10	10	15	15
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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